## CLAIMS:

1. A method comprising:

creating a data encoded object beam from an input light source using a first controllable portion of a spatial light modulator; and

creating a reference beam from the input light source using a second controllable portion of the spatial light modulator.

2. The method of claim 1, wherein the spatial light modulator includes a first set of controllable optical elements that define the first controllable portion of the spatial light modulator and a second set of controllable optical elements that define the second controllable portion of the spatial light modulator.

3. The method of claim 2, wherein the first set of controllable optical elements forms an interior portion of the spatial light modulator and the second set of controllable optical elements form a perimeter portion of the spatial light modulator.

4. The method of claim 2, further comprising controlling the first set of controllable optical elements to define a bit map in the data encoded object beam.

5. The method of claim 2, further comprising controlling the second set of controllable optical elements to define a reference mask in the reference beam.

6. The method of claim 2, wherein the first and second sets of controllable optical elements include transmissive optical elements.

7. The method of claim 2, wherein the first and second sets of controllable optical elements include reflective optical elements.

8. The method of claim 2, further comprising optically directing the data encoded object beam and the reference beam into a medium such that the data encoded object beam and the reference beam interfere to create a hologram in the medium.

9. The method of claim 8, wherein the data encoded object beam comprises a first data encoded object beam, the reference beam comprises a first reference beam and the hologram comprises a first hologram, the method further comprising:

creating a second data encoded object beam using the first controllable portion of a spatial light modulator;

creating a second reference beam using the second controllable portion of the spatial light modulator; and

optically directing the second data encoded object beam and the second reference beam into the medium such that the second data encoded object beam and the second reference beam interfere to create a second hologram in the medium.

10. The method of claim 9, wherein creating the second reference beam includes controlling the second set of controllable optical elements to define a reference mask in the second reference beam, wherein the reference mask in the second reference beam is different from the reference mask in the first reference beam.

11. The method of claim 10, wherein the reference mask in the second reference beam is substantially non-correlated with the reference mask in the first reference beam.

12. The method of claim 11, wherein the first and second holograms are stored in substantially a same location in the medium and are multiplexed in the medium by the first and second reference masks.

13. A spatial light modulator comprising:

a first set of controllable optical elements to create a data encoded object beam from an input light source; and

a second set of controllable optical elements to create a reference beam from the input light source.

14. The spatial light modulator of claim 13, wherein the first set of controllable optical elements form an interior portion of the spatial light modulator and the second set of controllable optical elements form a perimeter portion of the spatial light modulator.

15. The spatial light modulator of claim 13, further comprising a controller to control the first set of controllable optical elements to define a bit map in the data encoded object beam and to control the second set of controllable optical elements to define a reference mask in the reference beam.

16. The spatial light modulator of claim 13, wherein the first and second sets of controllable optical elements include transmissive optical elements.

17. The spatial light modulator of claim 13, wherein the first and second sets of controllable optical elements include reflective optical elements.

18. A holographic data storage system comprising:

a holographic medium; and

a spatial light modulator including a first set of controllable optical elements to create a data encoded object beam from an input light source, and a second set of controllable optical elements to create a reference beam from the input light source, wherein the data encoded object beam and reference beam interfere in the holographic medium to create a hologram.

19 The holographic data storage system of claim 18, further comprising:
a laser to produce the input light source; and
one or more optical elements to condition the input light source.

20. The holographic data storage system of claim 18, wherein the first set of controllable optical elements form an interior portion of the spatial light modulator and the second set of controllable optical elements form a perimeter portion of the spatial light modulator.